UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/537,224	11/16/2005	Michael Scherer	RPP-201	3427

24972 7590 03/18/2009
FULBRIGHT & JAWORSKI, LLP
666 FIFTH AVE
NEW YORK, NY 10103-3198

EXAMINER	
BAND, MICHAEL A	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
03/18/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/537,224	SCHERER ET AL.	
	Examiner	Art Unit	
	MICHAEL BAND	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *55-108* is/are pending in the application.

4a) Of the above claim(s) *92-108* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *55-91* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 December 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 83-91 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 83-91 have the limitation a value of a deficit. It is unknown or unclear what a value of a deficit is related to or signifies.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 55-74, 78, 80-91 are rejected under 35 U.S.C. 102(b) as being anticipated by Sullivan et al (US Patent No. 6,217,720).

With respect to claims 55-57 and 81-82, Sullivan et al discloses a method for depositing a complex optical multilayer coating on substrate (abstract), where fig. 1 depicts a reactive AC magnetron sputtering apparatus having targets (i.e. first constituent) [3] and a reactive gas inlet (i.e. second constituent) [9] of Ar and O_2. Sullivan et al further discloses that deposition power and oxygen flow must be rapidly

adjusted to maintain a desired stoichiometry of the coating (col. 5, lines 16-19; col. 8, lines 26-42). Fig. 1 also depicts a substrates [5] supported on a cage [4], where said cage is rotated (col. 6, lines 63-67). Sullivan et al also discusses fitting theoretical values derived from a model of the deposited layers to correspond to actual values obtained and continually controlling a process variable (i.e. oxygen partial pressure) to ensure homogeneity (i.e. stoichiometry) of the deposited layers so that a valid thickness determination can be made from said theoretical values (col. 5, lines 64-67; col. 6, lines 1-5).

With respect to claims 58-63, 78, and 80, Sullivan et al further discloses in fig. 1 the apparatus having an optical monitor (i.e. grating & PDA array) [7] for measuring the transmittance of the substrates [5], with fig. 2 depicting said optical monitor [7] using a computer [13] to determine layer thickness (col. 7, lines 5-10 and 25-31). Fig. 2 also depicts the thickness determination computer [13] affecting a process control computer [12] which in turn affects the oxygen flow control [11] and therefore affects the plasma. Sullivan et al also discloses measuring transmittance, reflectance, or ellipsometric value of the multilayer coating, with the theoretical values obtained by adjusting one or more layer thicknesses of the deposited layers in the theoretical model to fit the calculated data of the model to the measured data (col. 4, lines 50-56).

With respect to claims 65-68 and 72-74, Sullivan et al further discloses that homogeneity (i.e. stoichiometry) of the coating is achieved by varying (i.e. increasing and decreasing) a flow rate of the reactive gas, typically oxygen, so as to maintain a constant partial pressure of that gas (col. 5, lines 25-29). Fig. 2 also depicts that a

process control computer [12] regulates both oxygen flow control [11] and power control (i.e. cathode power) [14].

With respect to claims 69-70, Sullivan et al further discloses in figs. 5-6 relating oxygen partial pressure, sputtering rate (i.e. time), and sputtering power.

With respect to claim 71, Sullivan et al further discloses that the reactive gases are oxygen (O_2) or nitrogen (N_2) (fig. 1; col. 8, lines 11-13).

With respect to claims 83-86, 88, and 90-91, Sullivan et al discloses a method for depositing a complex optical multilayer coating on substrate (abstract), where fig. 1 depicts a reactive AC magnetron sputtering apparatus having targets (i.e. first constituent) [3] and a reactive gas inlet (i.e. second constituent) [9] of Ar and O_2. Sullivan et al further discloses that deposition power and oxygen flow must be rapidly adjusted to maintain a desired stoichiometry of the coating (col. 5, lines 16-19; col. 8, lines 26-42). Fig. 1 also depicts a substrates [5] supported on a cage [4], where said cage is rotated (col. 6, lines 63-67). Sullivan et al also discusses fitting theoretical values derived from a model of the deposited layers to correspond to actual values obtained and continually controlling a process variable (i.e. oxygen partial pressure) to ensure homogeneity (i.e. stoichiometry) of the deposited layers so that a valid thickness determination can be made from said theoretical values (col. 5, lines 64-67; col. 6, lines 1-5). Sullivan et al also discusses depositing four Nb_2O_5 layers, with SiO_2 layers in-between the Nb_2O_5 layers, thus the SiO_2 layers are a second layer and an interface layer.

With respect to claim 87, Sullivan et al further discloses typical deposition rates for Nb_2O_5 and SiO_2 as approximately 0.1 nm/s for RF sputtering (col. 2, lines 12-15), with deposition rates for AC sputtering in the range of 0.1 nm/s to 0.7 nm/s (col. 4, lines 57-62). Figs. 14-15 depicts layers having deposition times of approximately 50-35 sec, thus the thickness of the interface layer (i.e. SiO_2) is in the range of 3.5 nm-35 nm.

With respect to claim 89, Sullivan et al further discloses a reactive deposition of five different Nb_2O_5 layers, with SiO_2 layers between each Nb_2O_5 layer (col. 10, lines 58-64). Sullivan et al also discloses that a 58-layer coating is possible (col. 11, lines 39-41), thus the number of interface (i.e. SiO_2) layers is greater than 3.

5. Claim 75-77 and 79 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sullivan et al (US Patent No. 6,217,720).

With respect to claims 75-77, Sullivan et al further discloses the cage [4] supporting the substrates [5] rotating about a vertical axis with a stepping motor [6]. Sullivan et al also discloses using deposition rates of between 0.7 nm/s and 0.1 nm/s (col. 4, lines 57-62). Although a rotation speed is not specified, it is either inherent or obvious that the substrate is moved at a predetermined velocity, whether said predetermined velocity is a constant or variable velocity, in order to maintain these deposition rates.

With respect to claim 79, Sullivan et al discloses that the target-to-substrate distance is approximately 12 cm (col. 2, lines 12-15), which is a relatively small distance. Plasma in a sputtering apparatus is well known to be at least 100°C, therefore

it is either inherent or obvious that the substrate has heat applied via deposition material from a sputter target.

Response to Arguments

Specification

6. The Applicant has amended the Abstract to be within the proper length; the objection is withdrawn. The Applicant has amended the Specification to correct the typo regarding SiO_2; the objection is withdrawn.

Drawings

7. The Applicant has amended the Drawings to be in English; the objection is withdrawn.

112 Rejections

8. The Applicant has amended the claims to no longer be indefinite; the rejections are withdrawn with exception of the one given above.

102 Rejections

9. Applicant's arguments filed 12/12/2008 have been fully considered but they are not persuasive.

10. On p. 19, the Applicant argues that Sullivan et al fails to teach a method for producing one or more coatings on a moving substrate using a combination of reactive sputtering with a subsequent plasma treatment.

The Examiner respectfully disagrees. Contrary to the Applicant's assertion, Sullivan et al does teach a method for depositing a complex optical multilayer coating on substrate (abstract), where fig. 1 depicts a reactive AC magnetron sputtering apparatus having targets (i.e. first constituent) [3] and a reactive gas inlet (i.e. second constituent) [9] of Ar and O_2. Fig. 1 also depicts a substrates [5] supported on a cage [4], where said cage is rotated (col. 6, lines 63-67). Therefore Sullivan et al teaches depositing a multilayer coating (i.e. one or more coatings) by rotating (i.e. moving) the substrate using a combination of reactive sputtering by a first target and a subsequent plasma treatment via the second sputtering target. In addition, the claims do not require a subsequent plasma treatment following reactive sputtering.

11. On p. 19-20, the Applicant argues that the Examiner has used hindsight to modify the teaching of the prior art to render the claims unpatentable.

The Examiner respectfully disagrees. The Examiner has used only the reference of Sullivan et al in an anticipatory nature, therefore the Examiner is confused as to how hindsight was used to reconstruct the claims since a combination of references was not used.

12. On p. 20, the Applicant argues that Sullivan et al fails to teach a reactive deposition of a coating with a given stoichiometric deficit of the second constituent. The Applicant also argues that Sullivan et al fails to teach modifying the coating via plasma

treatment. The Applicant also argued that the Examiner has failed to establish a *prima facie* case of obviousness.

The Examiner respectfully disagrees. Sullivan et al teaches a reactive gas inlet (i.e. second constituent) [9] of Ar and O_2, with Sullivan et al further disclosing that deposition power and oxygen flow must be rapidly adjusted to maintain a desired stoichiometry of the coating (col. 5, lines 16-19; col. 8, lines 26-42). Since Sullivan et al teaches maintaining the stoichiometry of the O_2 (i.e. second constituent), Sullivan et al teaches maintaining a given stoichiometric deficit of the second constituent. With regards to the plasma treatment, Sullivan et al teaches a combination of reactive sputtering by a first target and a subsequent plasma treatment via the second sputtering target. With regards to a *prima facie* case being established, the Examiner has not rejected any claims over an explicit 103 rejection. If the Applicant is pointing out the 102/103 rejection, the obviousness statement is as follows: "Although a rotation speed is not specified, it is either inherent or obvious that the substrate is moved at a predetermined velocity, whether said predetermined velocity is a constant or variable velocity, in order to maintain these deposition rates".

13. On p. 21-22, the Applicant argues that Sullivan et al does not teach monitoring the coating and adjusting the optical properties of the coating as in claims 59-60. The Applicant also argues that Sullivan et al does not teach regulating the plasma source as in claim 63. The Applicant also argues that Sullivan et al does not teach depositing a coating with a preset deficit of the reactive component as in claim 66. The Applicant also argues that Sullivan et al does not teach establishing partial pressures of the

reactive component in the area of the plasma source as in claim 72. The Applicant also argues that Sullivan et al does not teach generating a plasma action by the plasma source as in claim 73. The Applicant also argues that Sullivan et al does not teach the interface layer between the high-refractive and low-refractive layer has a deficit value of the reactive component is less than 0.5 as in claim 87. The Applicant also argues that Sullivan et al does not teach selecting a diminishing value of the deficit of the reactive component as the rate of deposition increases as in claim 88. The Applicant also argues that Sullivan et al does not teach utilizing a plasma source to modify the structure of the layer as in claim 90.

The Examiner respectfully disagrees. Contrary to the Applicant's assertions, Sullivan et al teaches ALL of these limitations. The following is from the rejection of claims 59-60 and 63: "Sullivan et al further discloses in fig. 1 the apparatus having an optical monitor (i.e. grating & PDA array) [7] for measuring the transmittance of the substrates [5], with fig. 2 depicting said optical monitor [7] using a computer [13] to determine layer thickness (col. 7, lines 5-10 and 25-31). Fig. 2 also depicts the thickness determination computer [13] affecting a process control computer [12] which in turn affects the oxygen flow control [11] and therefore affects the plasma. Sullivan et al also discloses measuring transmittance, reflectance, or ellipsometric value of the multilayer coating, with the theoretical values obtained by adjusting one or more layer thicknesses of the deposited layers in the theoretical model to fit the calculated data of the model to the measured data (col. 4, lines 50-56". Therefore Sullivan et al teaches using an optical monitor to adjust (i.e. regulate) the plasma characteristics. The

following is from the rejection of claims 66 and 72-73: “Sullivan et al further discloses that homogeneity (i.e. stoichiometry) of the coating is achieved by varying (i.e. increasing and decreasing) a flow rate of the reactive gas, typically oxygen, so as to maintain a constant partial pressure of that gas (col. 5, lines 25-29). Fig. 2 also depicts that a process control computer [12] regulates both oxygen flow control [11] and power control (i.e. cathode power) [14]". Therefore Sullivan et al teaches depositing a reactive coating where the homogeneity (i.e. preset deficit) is maintained, with a partial pressure established of the reactive component in the plasma. The following is from the rejection of claim 87: “Sullivan et al further discloses typical deposition rates for Nb_2O_5 and SiO_2 as approximately 0.1 nm/s for RF sputtering (col. 2, lines 12-15), with deposition rates for AC sputtering in the range of 0.1 nm/s to 0.7 nm/s (col. 4, lines 57-62). Figs. 14-15 depicts layers having deposition times of approximately 50-35 sec, thus the thickness of the interface layer (i.e. SiO_2) is in the range of 3.5 nm-35 nm". The following is from the rejection of claims 88 and 90: “Sullivan et al discloses a method for depositing a complex optical multilayer coating on substrate (abstract), where fig. 1 depicts a reactive AC magnetron sputtering apparatus having targets (i.e. first constituent) [3] and a reactive gas inlet (i.e. second constituent) [9] of Ar and O_2. Sullivan et al further discloses that deposition power and oxygen flow must be rapidly adjusted to maintain a desired stoichiometry of the coating (col. 5, lines 16-19; col. 8, lines 26-42). Fig. 1 also depicts a substrates [5] supported on a cage [4], where said cage is rotated (col. 6, lines 63-67). Sullivan et al also discusses fitting theoretical values derived from a model of the deposited layers to correspond to actual values obtained and continually controlling

a process variable (i.e. oxygen partial pressure) to ensure homogeneity (i.e. stoichiometry) of the deposited layers so that a valid thickness determination can be made from said theoretical values (col. 5, lines 64-67; col. 6, lines 1-5). Sullivan et al also discusses depositing four Nb_2O_5 layers, with SiO_2 layers in-between the Nb_2O_5 layers, thus the SiO_2 layers are a second layer and an interface layer". Therefore Sullivan et al teaches adjusting process variables to attain a diminishing deficit of the reactive component, where the plasma continually modifies the layer since the properties of the plasma are rapidly being adjusted.

Conclusion

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Band whose telephone number is (571) 272-9815. The examiner can normally be reached on Mon-Fri,9am-5pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

16. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./

Examiner, Art Unit 1795

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795